

PROOFS

Example:

Show that $y = ae^{2x} + be^{-x}$ is a solution of the differential equation $y'' - y' - 2y = 0$.

If $y = ae^{2x} + be^{-x}$

then $y' = 2ae^{2x} - be^{-x}$

and $y'' = 4ae^{2x} + be^{-x}$

$$\text{LHS} = y'' - y' - 2y$$

$$= 4ae^{2x} + be^{-x} - (2ae^{2x} - be^{-x}) - 2(ae^{2x} + be^{-x})$$

$$= 4ae^{2x} + be^{-x} - 2ae^{2x} + be^{-x} - 2ae^{2x} - 2be^{-x}$$

$$= 4ae^{2x} - 4ae^{2x} + 2be^{-x} - 2be^{-x}$$

$$= 0$$

$$\text{RHS} = 0$$

$$\text{So LHS} = \text{RHS}$$